

Image source: EnDev website, link

EnDev DSS Performance Study

Niger country report

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Netherlands Enterprise Agency

endev

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Abbreviations

ANERSOL	Agence Nationale d'Énergie Solaire
ATP	Ability to Pay
CARM	Community Accountability Reporting Mechanism
DSS	Demand-Side Subsidies
EnDev	Energising Development
ESMAP	Energy Sector Management Assistance Program
FCFA	Franc CFA
FDP	Forcibly Displaced Persons
FGD	Focus Group Discussion
FM	Fund Manager
GDPR	General Data Protection Regulation
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GPS	Global Positioning System
HASKE	Niger Solar Electricity Access Project
HH	Household
ID	Identification
IDP	Internally Displaced Person
IVA	Independent Verification Agent
KII	Key Informant Interview
LNOB	Leave No One Behind
LQ	Learning Question
MTF	Multi-Tier Framework for Measuring Access to Electricity
NDF	Niger Development Foundation
OGS	Off-Grid Solar
OM	Operations Manual
PAYGo	Pay-As-You-Go financing
RBF	Results-Based Financing
RVO	Netherlands Enterprise Agency
SHS	Solar Home System
SNAE	Stratégie Nationale d'Accès à l'Électricité
UNHCR	United Nations High Commissioner for Refugees
USD	United States Dollar
VeraSol	International quality assurance standard for off-grid solar products
WB	World Bank
WTP	Willingness to Pay

1. Executive summary

Background

Niger's rural off-grid solar market is still at a very early stage of development, characterised by extremely low electrification levels, limited penetration of certified solar products, and weak formal distribution infrastructure. Prior to the DSS pilot, national electrification was estimated at approximately 19%, with rural access below 10%, while cumulative sales of certified off-grid solar systems between 2022 and 2023 were estimated at roughly 4,000 units nationally. In the target regions of Maradi and Tahoua, formal last-mile distribution networks, after-sales service capacity, and consumer familiarity with quality-certified solar products were all limited.

Affordability was a major barrier to uptake, but it interacted with a broader set of structural market constraints. Companies faced high delivery and operating costs in dispersed rural areas, weak logistics infrastructure, limited local agent networks, low levels of consumer awareness, and lingering distrust linked to previous exposure to poor-quality products. These challenges were further compounded by the presence of highly vulnerable host communities and Forcibly Displaced Persons (FDPs), within a rural population that faces widespread, structural economic hardship, where 41% of people live in extreme poverty and experience heightened energy access vulnerabilities.[1]

Within this context, the DSS pilot was designed not only to reduce the end-user price of solar products but also to stimulate initial market demand and support the development of a structured, organised, and efficient local solar market ecosystem that enables companies to distribute systems sustainably even in last-mile areas. The programme, therefore, combined targeted consumer subsidies with complementary supply-side support, local agent engagement, and private sector coordination, intended to facilitate market entry and expand access to quality-certified off-grid solar products over time.

Programme design

The DSS pilot is implemented by EnDev through a Fund Manager structure led by Mercy Corps in coordination with the National Solar Energy Agency of Niger (ANERSOL) as the national solar agency, with UNHCR and local authorities supporting FDP identification, and with an Independent Verification Agent (IVA) ensuring claim integrity. Key design features are summarised below.

Design	Key elements
Targeting	Geographic and demographic targeting in selected communes of Maradi and Tahoua, covering rural host communities, refugees, and Internally Displaced Persons (IDPs) located in areas not connected to the national grid To adapt to the security disruptions that impacted sales dynamics, the project teams, in coordination with UNHCR, expanded the intervention zone to include the additional communities of Guidan Sori and Chadakori in the Maradi region, as well as Sabon Guida and Azarori in the Tahoua region.

[1] *World Bank Data: Poverty Rate at National Poverty Line(s) - % of Population 2021, Link*

	Eligibility was verified through local administrative records, national identification documents, and IDP lists maintained in Kobo, informed by EnDev's 2024 socio-economic study.
Subsidy level	The initial design included a smaller Pico-PV system and a larger Solar Home System (SHS) to promote first-time electricity access for each subgroup. Under this design, the pilot applied a uniform end-user price of 15,000 FCFA for SHS and 8,500 for Pico across both host community and FDP households. However, towards the end of the programme, a differentiated, lower-end user price of 7,500 FCFA for SHS specifically for FDP households was introduced for 2 months. The lower FDP price was introduced after an ability-to-pay analysis and consultations with UNHCR, local authorities, and affected communities. Despite this reduction, user contribution was maintained to support engagement and reduce the risk of product misuse or low uptake commitment.
Delivery model	Retail discounts were channelled through private solar companies using a Results-Based Financing mechanism, providing upfront price reductions to end-users at the point of sale. Companies submitted periodic claims to the Fund Manager (Mercy Corps), with subsidy payouts disbursed only after sales were verified through phone and field checks by an IVA. To support working capital within this performance-based model, advance payments of up to 40% of the contract value were incorporated alongside supply-side support to ensure products reached remote and displacement-affected areas.
Financing	Most purchases are made through cash or short-cycle instalments. Although Pay-As-You-Go (PAYGo) functionality was permitted in the pilot's initial design, it was ultimately never utilised by participating companies in practice, due to mobile network limitations, including poor internet coverage and a lack of mobile money accounts, as well as the high logistical and operational costs associated with collecting monthly payments and recuperating defaulted systems in remote areas. To mitigate these risks, companies introduced flexible, short-term instalment plans, consisting of a 50% downpayment with the remainder paid after one or two months. Because of the extremely low financial digitalisation and mobile money penetration, payment collection continued to rely heavily on local sales agents and cash-based processes.
Verification	Independent verification is used to protect claim integrity, confirm eligible sales, and strengthen company reporting quality. As a support measure to stimulate business expansion and increase companies' available working capital, the pilot scheduled verification and disbursements monthly. Although reimbursement delays occasionally created operational pressures for participating companies, these initial bottlenecks were primarily related to the fact that the implementing partners in Niger, including the participating solar companies themselves, lacked prior experience with RBF mechanisms. Consequently, the first verification rounds naturally served as a learning process, and the system became increasingly efficient over time as stakeholders gained familiarity with the reporting and verification procedures.

Objectives

The study assesses how the DSS pilot has performed against the two EnDev learning questions: how scarce public funding can be used efficiently to reach low-income and marginalised groups (LQ1), and how DSS can be designed to minimise market and price distortion (LQ2).

Methodology

The evidence base combines: 250 household surveys in Tahoua and Maradi (94.8% host, 1.6% refugees, 3.6% IDPs). The sample, therefore, primarily reflects host community beneficiary experience, due to access constraints and the timing of fieldwork relative to the later increase in FDP uptake. FDP perspectives were supplemented through targeted FGDs and KIIs with beneficiaries, local authorities, UNHCR, participating companies, the Fund Manager, and ANERSOL, strengthening interpretation of findings related to affordability, differentiated pricing, and inclusion.

Key findings

- **The DSS pilot has catalysed rural OGS uptake at a scale not previously seen in Niger's formal market.** The pilot has sold over 13,000 systems, compared with fewer than 4,000 certified systems sold nationally across 2022–2023. Survey and FGD findings suggest the pilot materially reduced affordability barriers for reached households, with beneficiaries reporting strong daily use and clear improvements in household energy access.
- **Targeting reached poor households, but FDP uptake required deeper subsidies.** Initial efforts used product differentiation, offering smaller Pico systems tailored to refugee incomes and SHS for host communities. However, strong consumer preference for the technical benefits of SHS and high inventory risks for private suppliers pushed Pico systems out of the market. EnDev introduced a progressive strategy, combining targeted awareness campaigns with flexible instalment plans, but the deep income gap kept SHS out of reach for most refugees. FDP sales rose to 20% of total sales after the subsidy level was directly adjusted, demonstrating that affordability remains a key decisive factor for inclusion.
- **Differentiated pricing did not trigger broad social tension, though fairness required continuous monitoring.** Most beneficiaries reported no major friction regarding the adapted pricing structure for FDPs. To safeguard social cohesion before deepening the refugee subsidy the program conducted a complementary socio-economic study and extensive FGDs closely coordinated and accompanied by UNHCR, ensuring host community members understood the financial constraints of displaced households and supported the decision. While this targeted consultation mitigated tension, the scale of the intervention zone made individual sensitisations for all residents logistically impossible, resulting in minor, isolated questioning.
- **Verification systems have strengthened programme accountability and improved company reporting practices, but reimbursement timelines emerged as a major operational bottleneck**. Most rejected claims were linked to documentation and data-quality issues rather than fraudulent sales. While reporting quality improved over time, verification and administrative process delays occasionally created temporary liquidity pressure for participating firms
- **The pilot supported early market creation rather than crowding out commercial activity, showing limited evidence of systematic resale or leakage.** To ensure companies can sustain these distribution networks as subsidies decline, EnDev established a localised energy ecosystem that reduces long-term

operational costs beyond the DSS. This infrastructure, combined with active demand stimulation, significantly lowers ongoing logistical overhead, making the market commercially viable for private operators over the long term.

Recommendations

- **Retain the programme's geographic and demographic targeting approach for low-data and displacement-affected contexts, while strengthening the underlying beneficiary identification systems used by local authorities and humanitarian partners**. The pilot demonstrated that existing local records could provide a practical foundation for targeting where national social registries are absent, but clearer protocols and continued data strengthening will be important for future scale-up.
- **Conduct comprehensive ability-to-pay analyses by beneficiary segment at the program design stage to align both product selection and subsidy levels.** During the design phase, the program effectively utilised product diversity to accommodate the distinct income levels and basic electricity needs of host and refugee populations. When implementation data revealed unexpected gaps, such as low Pico-PV uptake and persistent affordability barriers for FDP households, the program adjusted its approach. Future programs should build on this model by translating early ability-to-pay findings into distinct pricing tiers from the outset, maintaining a structured review mechanism to enable timely adjustments, and avoiding an overly broad range of technology tiers that can create inventory risks and operational challenges for participating companies
- **Treat ecosystem-building investments as a core component of market development in highly nascent contexts, not as a secondary implementation feature.** Community agents, sales infrastructure, logistics support, and local commercial hubs played a critical role in enabling last-mile delivery in areas where formal distribution networks were previously absent. Future programmes should plan early for how these functions transition from programme-supported structures to commercially sustainable models over time.
- **Maintain strong independent verification systems while simplifying operational processes to reduce reimbursement delays and protect supplier liquidity.** The program established reporting fields and provided continuous onboarding and technical training for participating companies. However, implementation realities such as low digital literacy and RBF readiness among some local partners, poor network coverage, and geographical barriers in remote areas created operational bottlenecks that delayed processing. Future programs should account for these structural and environmental constraints by building in flexible validation and verification alternatives for low-connectivity zones, deploying intensive, ongoing field-level coaching, and tracking the complete payment-cycle timeline as a core operational KPI to better balance public accountability with supplier sustainability.
- **Link households with no reliable payment capacity to complementary humanitarian or social protection channels.** The program was deliberately designed around a market-based approach, which successfully built local commercial viability and expanded access for households with some economic capacity. However, pilot data showed that a distinct segment of the population remained unable to participate even at the subsidised prices. Because this segment cannot be sustainably reached through market-driven energy tools alone, future initiatives should design formal operational intersections with humanitarian actors, such as sharing socio-economic mapping data, so that cash-transfer programs or

direct aid can layer with market mechanisms to build the purchasing power of ultra-vulnerable households.

Key takeaways

The Niger DSS pilot has delivered the largest recorded wave of certified off-grid solar uptake in rural Niger, in areas affected by insecurity, displacement, and limited commercial activity. Beneficiaries reported that the product was affordable, useful, and reliable, with very limited social tension and no clear signs of resale, leakage, or displacement of existing sales.

Three design choices stand out as having driven this outcome: an evidence- based and consultative subsidy adaptation that increased FDP reach to more than 20% of total sales after the subsidy was deepened for FDP households; programme built delivery infrastructure that compensated for the absence of a pre-existing rural commercial network through agents, kiosks, logistics support, and after-sales presence; and a deliberate verification design that preserved RBF integrity while improving company reporting quality, although reimbursement delays created operational strain for participating companies.

The pilot has also revealed four genuine trade-offs that the next phase of work has to manage: residual zero-income households that remained unable to purchase even at subsidised prices, company liquidity pressure under the current verification cycle, continuity of demand after the pilot, and continued monitoring of fairness perceptions around differentiated pricing. Overall, the Niger DSS pilot provides important evidence that demand-side subsidies can support access and early market development when paired with operational flexibility and delivery infrastructure.

2. Country context and relevance for DSS

Niger's energy access challenge sits at the intersection of low electrification, a structurally thin off-grid solar market, low purchasing power, geographic dispersion, and humanitarian fragility. National electrification is estimated at around 19%, and rural electrification is below 10%. Off-grid solar is positioned within the national electrification strategy with a target contribution of approximately 10% of access by 2035, but at the start of the pilot, rural delivery infrastructure was very limited.[1]

The off-grid solar market in Niger was sharply divided before the DSS pilot. A nascent urban core in Niamey hosted a small set of certified product distributors with limited market outreach outside Niamey, particularly in the intervention areas of Maradi and Tahoua, where there was no formal commercial distribution at scale. Cumulative certified off-grid solar sales across the country between 2022 and 2023 are estimated at fewer than 4,000 units. Where solar products did circulate, they were predominantly low-quality, uncertified imports purchased through informal channels, which eroded consumer trust in solar as a category and made certified products commercially harder to sell at any price.

Affordability is the principal demand-side constraint, but it sits alongside several structural barriers that DSS alone cannot resolve. Interviews with companies, ANERSOL and FGDs converge on three additional barriers: limited private sector depth and working capital, especially in rural delivery; weak digital and financial infrastructure (low mobile money penetration, irregular connectivity), which constrains PAYGo and remote verification; and substantial macroeconomic and security volatility, with population mobility, fluid household structures and a humanitarian caseload of over 700,000 forcibly displaced persons. PAYGo specifically faces a binding combination of default risk and geographic cost-to-serve in addition to mobile money limitations, which together explain its slow rollout in Niger.

DSS is therefore positioned as one vehicle within a broader market-building approach – the demand-side ignition mechanism for a rural market that previously did not function commercially. EnDev's 2024 socio-economic study of the intervention zone confirms that the rural population in Maradi and Tahoua includes both extremely vulnerable host communities and FDP populations with limited or no income, and that affordability constraints in the intervention zone are structural rather than situational. Identification infrastructure is sufficient to operationalise eligibility through existing instruments: municipal family booklets issued by municipalities, national ID cards, and IDP lists maintained by local authorities in paper or Excel format, periodically uploaded into Kobo by project staff.

The instrument is complemented by a parallel supply-side programme. The World Bank-financed HASKE programme is the natural supply-side complement to the demand-side track that DSS has piloted and is positioned as the principal vehicle for the longer-run market-building agenda. Coordination between EnDev and HASKE is therefore central to a credible post-DSS pathway in the intervention areas.

This report assesses how the DSS pilot in Niger addresses these structural constraints, and how design and implementation choices influence both access outcomes and market development. It focuses on the operational realities of reaching the most vulnerable populations in Maradi and Tahoua – including FDPs – and

[1] *EnDev DSS pilot - Niger Concept Note / 2025 update.*

on the market dynamics that shape programme outcomes, to inform the design and scale-up of future demand-side interventions in Niger and comparable last-mile, displacement-affected contexts.

3. Research objectives and methodology

3.1. Study objectives and learning focus

The study is structured around two core EnDev learning questions and a set of underlying research questions linked to the ESMAP End-User Subsidies Toolkit.[1]

- LQ1. How can scarce public funding be used most efficiently to reach low-income and marginalised groups?
- LQ2. How can DSS be designed to minimise market and price distortion?

The detailed research-question matrix has been moved to Annex A to keep the body of the report focused on how evidence answers the learning questions. The matrix maps each underlying research question (targeting effectiveness; subsidy calibration; verification design; communication; behavioural effects; market distortion) to LQ1, LQ2, or both, and to the corresponding ESMAP design element.

3.2. Mixed-methods evidence base

The study combines five evidence streams, each contributing differently to the learning questions.

Source	Scope	Analytical contribution
Household survey	250 verified DSS beneficiaries in Tahoua and Maradi; 56.4% in-person and 43.6% by phone; sample stratified across host (94.8%), refugee (1.6%), and IDP (3.6%) categories	Affordability, awareness, perceived fairness, payment behaviour, usage, after-sales, and willingness to pay for future products. Primary source for LQ1 reach indicators and LQ2 behavioural indicators.
Focus Group Discussions	Three FGDs: Doukou-Doukou (mixed host – FDP), Garin Kaka host community, Garin Kaka Village of Opportunity (refugees)	Perceptions, social dynamics, fairness, gender, willingness to pay, post-programme expectations. Particularly relevant for LQ2 distortion-related dimensions
Key informant interviews	Four KIIs: ANERSOL (regulator / national solar agency), Mayaki Trading, Sol Niger, Ouba Energy	Implementation realities, verification experience, internal risk management, market-strategy implications, and views on exit. Anchors LQ1 efficiency and LQ2 distortion findings on the supply side
IVA and Fund Manager data	Sales, eligibility, verification rejection, and payment-cycle data from the Fund Manager (Mercy Corps) and from the IVA	Validated sales volumes, FDP reach, rejection rates, reasons, and payment turnaround. Critical for LQ1 efficiency findings

[1] *ESMAP, End-User Subsidies Toolkit for Energy Access.*

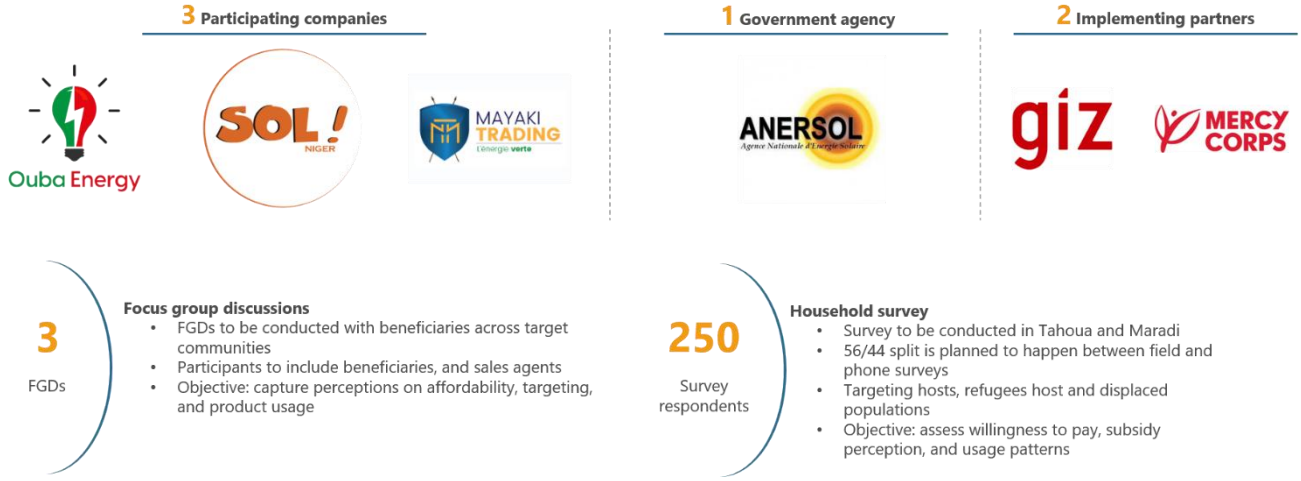
Source	Scope	Analytical contribution
Programme documentation	Subsidy-adaptation memos, FGD reports prepared by EnDev / UNHCR, and programme reporting.	Contextual baseline, historical sequence of subsidy adaptation, and corroboration of programme-level outcomes.

3.3. Sampling and field implementation

Sampling was guided by the operational footprint of the pilot. Locality selection focused on Tahoua and Maradi regions, and within these on departments and communes with confirmed concentrations of DSS beneficiaries (Madaoua, Bagaroua, Guidan Roumdji, and surrounding communes). Beneficiaries were drawn from the validated Fund Manager and IVA databases through randomised, stratified sampling. The 56.4% field / 43.6% phone split reflects security and access constraints rather than a methodological preference. Replacement followed a three-contact-attempt protocol with a 100% replacement reserve. Data collection followed GDPR principles, with no names or exact coordinates and sensitive indicators in non-identifiable categorical form.

Three limitations should be borne in mind. First, the survey universe is the validated beneficiary list and does not include households excluded by targeting or aware of the pilot but not purchasing; their experience is captured indirectly through FGDs and KIIs. Second, the achieved sample under-represents FDPs (1.6% refugees and 3.6% IDPs) relative to programme-level reach of approximately 20%, so FDP-specific quantitative findings are indicative and are triangulated through the Garin Kaka VO FGD and KIIs. Third, the pilot is still active at the time of writing; findings on post-subsidy behaviour are necessarily prospective.

Figure 1: *Snapshot of stakeholder engagement*



4. Pilot context and operational overview

The Niger DSS pilot is implemented by EnDev through a Fund Manager structure led by Mercy Corps, in coordination with ANERSOL as the national solar agency, with UNHCR and local authorities supporting FDP identification, and with an Independent Verification Agent ensuring claim integrity. The pilot is operationally focused on Maradi and Tahoua regions, with intervention sites adapted over time in response to security and displacement dynamics, particularly in Tahoua. The pilot has delivered more than 13,000 quality-certified systems

to date and has strengthened the last-mile delivery mechanism through a larger network of community agents, pavilions, and kiosks that could help sustain market development beyond the pilot phase.

4.1 Targeting

Initial design

The pilot used a geographic plus demographic targeting approach adapted to a data-constrained context. The targeting methodology combined geographic, demographic, socio-economic criteria, and electrification rates, with a focus on areas that were not electrified and were unlikely to receive grid access in the short term. However, some targeted zones, such as Bangui, had mini-grids that technically existed but operated unreliably, sometimes only 2 to 3 hours per day. This reinforced the continued relevance of off-grid solar solutions even in nominally electrified areas.

Several data sources and identification systems were mobilised, including UNHCR databases, which were used for refugees and internally displaced persons (IDPs), local authority databases, and municipal records, which supported host community targeting, municipal family booklets and refugee registration documents helped validate refugee eligibility. The Kobo systems integrated multiple local datasets for verification and registration. This approach helped to strengthen inclusion and reduce fraud risks while maintaining flexibility in areas with mixed population profiles. A detailed socio-economic study informed subsidy calibration and affordability thresholds. Localities were selected from underserved communes in Maradi and Tahoua based on operational accessibility and on the EnDev Niger 2024 socio-economic study on the intervention zone. Within selected communities, all households were eligible to purchase one subsidised system.

Implementation reality and drivers of change

The introduction of QR-code-based voucher systems was explored to strengthen tracking and reduce fraud risks. Beneficiaries would receive vouchers with QR codes scanned during purchase. However, the estimated cost of printing and distributing vouchers for approximately 60,000 beneficiaries was around €250,000-300,000, and the option was ultimately considered too costly relative to program size and objectives. Given the high vulnerability and poverty rates in the target communities, EnDev opted to allocate more funds to subsidy and market-development activities, judging that municipality records and local-authority lists provided sufficient eligibility integrity at scale. Geographic scope was adjusted during implementation in response to security and displacement dynamics, particularly in Tahoua, where deteriorating security broke down established last-mile market ecosystems due to the limited mobility of sales agents. Additional communities were included to sustain program reach when local sales became difficult.

4.2 Subsidy level

Initial design

The subsidy was designed to reduce the upfront cost of off-grid solar products from unsubsidised retail prices of approximately 83,000 FCFA (~USD 151) for an SHS, while preserving a beneficiary contribution to ensure ownership and proper usage. To accommodate income disparities, low saving capacities, and differentiated electricity needs between the two target groups without distorting a nascent market, Niger introduced product diversity by supporting smaller Tier-1 Pico-PV systems (for lighting and phone charging) alongside a larger Tier-1 SHS (which included a radio). This was implemented because smaller systems at lower price points were expected to be more accessible and suitable for FDP households, while larger systems at higher price points were expected to be more suitable for host community households. To preserve social cohesion, the pilot applied a uniform relative subsidy, translating to an end-user price of around 15,000 FCFA (~USD 27.3) for SHS across both

host and FDP groups. Beneficiary contributions were payable in cash or in two short-cycle instalments, with deactivation as the repayment-enforcement mechanism.

Implementation reality and drivers of change

During implementation, Pico-PV products faced extremely low demand. Despite initially anticipating high demand from FDP households due to the lower price point, uptake of Pico systems reached less than 1% of overall sales by December 2025, as both host and FDP households preferred the SHS due to its additional benefits. To avoid inflating sales costs and undermining the financial health of the participating solar companies, the project adjusted its approach in April/May 2025, giving companies the flexibility to convert their contractually allocated Picos into SHS. Additionally, the program temporarily introduced differentiated promotional approaches for refugees and host communities to reflect affordability gaps and social dynamics. During Ramadan, refugees benefited from a special promotion allowing access to systems at around XOF 7,500 (~USD 13.6). Host communities received non-cash incentives, such as household items (basins, soap, etc.), alongside purchases, partly to support social acceptance and avoid perceptions of unfairness. The differentiated subsidy approach was carefully informed by socio-economic studies and FGDs, which explored perceptions around equity and affordability.

4.3 Subsidy delivery

Initial design through implementation

Delivery was implemented through participating private-sector companies under a performance-based allocation system, with significant programme support designed to make rural distribution viable. The portfolio includes participating firms such as Sol Niger, Mayaki Trading, and Ouba Energy. Implementation was initially constrained by supply-side limits, including a multi-month delay due to stock shortages in 2025 and binding working-capital constraints. To address these, advance payments to companies were increased from 30% to 40% of the contract value, enabling the financing of inventory shipments of around 6,000 SHS per container. Additionally, the project allowed these advance payments to be transferred directly to the international manufacturer, provided the local solar company mandated the Fund Manager to do so, resolving the inventory shortages and ensuring sufficient stock availability for the pilot. The programme has deployed approximately 500 community-based agents trained in installation, marketing and maintenance, with standardised commission incentives of up to 3,000 FCFA (~USD5.4) per system sold and installed; trucks and logistics support to extend reach into remote communes; 50 sales pavilions to expand distribution presence; and two energy kiosks established in strategic locations to function as permanent commercial hubs for sales, repair and after-sales service. The HH survey confirms that delivery reached households quickly and was well received: 81.2% of respondents received the product within seven days of ordering, 97.6% reported the agent or company was at least sometimes available to help in case of difficulty, and FGDs in all three sites describe agent interactions as respectful and warm.[1]

4.4 Verification

Initial design

[1] *EnDev Niger, Verification Guide, revision September 2024*

Verification follows an RBF logic, with subsidies disbursed against confirmed eligible sales. The Fund Manager conducts initial data consistency and completeness checks before forwarding claims to the IVA, who completes paper-trail, phone-based, and field-level verification. The verification process deliberately prevented the IVA from liaising directly with companies to protect the integrity of a first-of-its-kind RBF rollout in Niger.

Implementation reality and drivers of change

The verification process evolved through three distinct phases. During the baseline-setting phase, the IVA rejected without exception any sales records missing GPS coordinates, customer identifiers, or required witness numbers. This strict approach signalled early that informal reporting practices would not be accepted, which contributed to high initial rejection rates. In the adaptive phase, the Fund Manager and the project teams worked with companies through structured regularisation rounds to validate sales that had been legitimately completed but insufficiently documented. By the maturity phase, companies had significantly improved the quality of their submissions, and final-round data required far fewer corrections and follow-up actions. When the IVA was no longer able to travel to certain districts due to security, the programme used teams already on the ground to support verification, a documented adaptation showing that the system has adapted to field conditions.

4.5 Exit strategy

Initial design

The pilot was designed as an adaptive and learning-oriented intervention to inform future DSS scale-up in Niger. The original design contemplated a phase-out managed through clear consumer communication about the temporary nature of the discount and through handover of established tools to local partners.

Implementation reality and drivers of change

Several elements of a post-DSS pathway are already in place, even though a formal exit strategy has not yet been fully operationalised. The 500 community agents, 50 pavilions, and two kiosks represent a permanent or semi-permanent commercial footprint that lowers customer-acquisition cost for participating companies in the future. Discussions with the Niger Development Foundation (NDF) and participating companies are underway around a kiosk-based commercial model in DSS zones after the pilot, complemented by longer PAYGo cycles and tighter risk controls. Coordination with the World Bank-financed HASKE programme ensures a comprehensive approach to the national electrification agenda. While DSS makes products affordable for users, HASKE helps solar companies establish distribution networks in remote areas.

5. Findings

***Figure 1**: Snapshot of household and respondent profile*

250

Beneficiaries surveyed

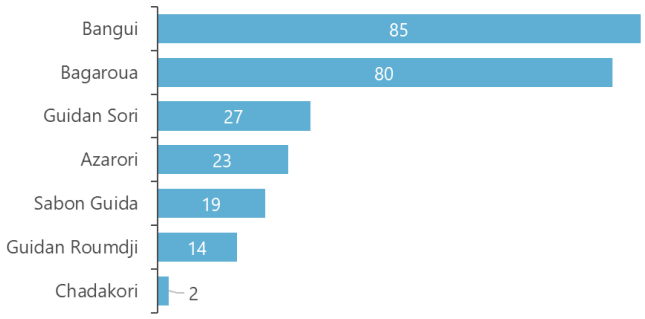
231 beneficiaries were hosts

9 beneficiaries were IDPs

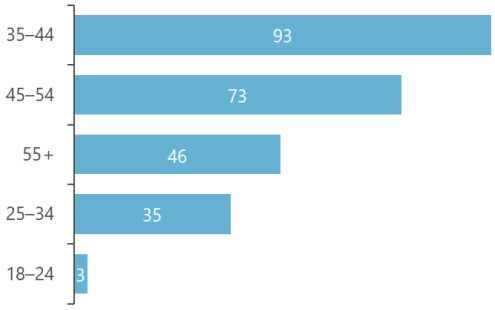
4 beneficiaries were refugees

General overview

Respondents per district



Respondents age, *years*



5.1. Targeting effectiveness and efficiency

Results: Geographic targeting combined with local-authority vulnerability records was workable in Niger's low-data, displacement-affected context, but FDP reach only improved materially after the subsidy was deepened

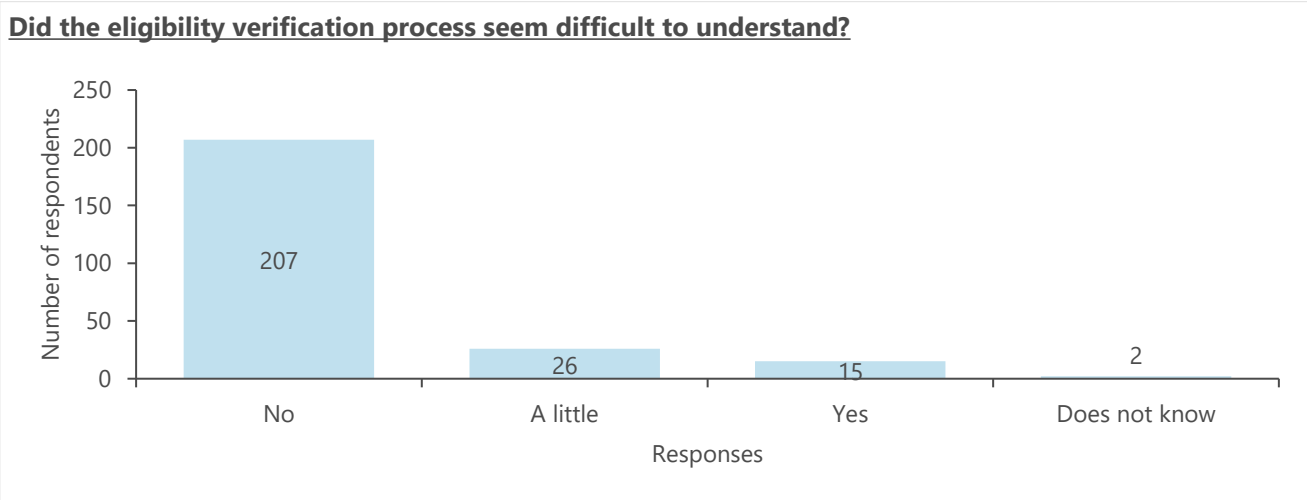
Geographic and demographic targeting was operationally workable in Niger's low-data and displacement-affected context. The pilot combined the selection of underserved communes in Maradi and Tahoua with a vulnerability lens distinguishing rural host communities, refugees, and IDPs. Eligibility was operationalised through existing local systems, including municipal family booklets, national ID cards, and IDP lists maintained in Kobo by local authorities, informed by EnDev's 2024 socio-economic study. This approach provided a practical alternative to household-level poverty scoring in a context where socio-economic data is limited and population mobility is high.

Targeting design alone was not sufficient to secure FDP inclusion. Programme data shows that FDP households now account for over 20% of total sales, up from a single digit share before the subsidy level was deepened. Initial efforts to bridge the host-refugee income gap relied on product differentiation, offering smaller Pico-PV systems for refugees and larger SHS for host communities. When weak market demand and high inventory risks pushed Pico systems out of the market, EnDev deployed a progressive strategy combining flexible instalment plans and targeted awareness campaigns with UNHCR to make the preferred SHS units accessible. While these measures stimulated some demand, the refugee market still lagged due to a low baseline affordability gap, where the FDP median income was three times lower than the host income. Ultimately, effective reach depended on whether the final price matched their ability to pay, meaning that geographic and demographic targeting can support reach, but subsidy depth must be calibrated separately for groups with different affordability thresholds.

Beneficiaries generally understood the basis for eligibility, supporting the legitimacy of the targeting model. Survey evidence shows that most respondents were aware of the subsidy before receiving the product and did not find the eligibility process difficult to understand. FGDs in Doukou-Doukou and Garin Kaka also

indicate that participants broadly understood the role of residency, family-card identification, and displacement status in determining eligibility. Residual inclusion pressure was limited but visible, especially among larger households. Open comments mainly called for wider product availability, continued subsidies, lower prices, higher-capacity kits, and stronger after-sales support. These signals point to residual inclusion questions, but do not undermine the overall workability of the targeting approach.

Figure 2: *Respondent purchase process and ownership*



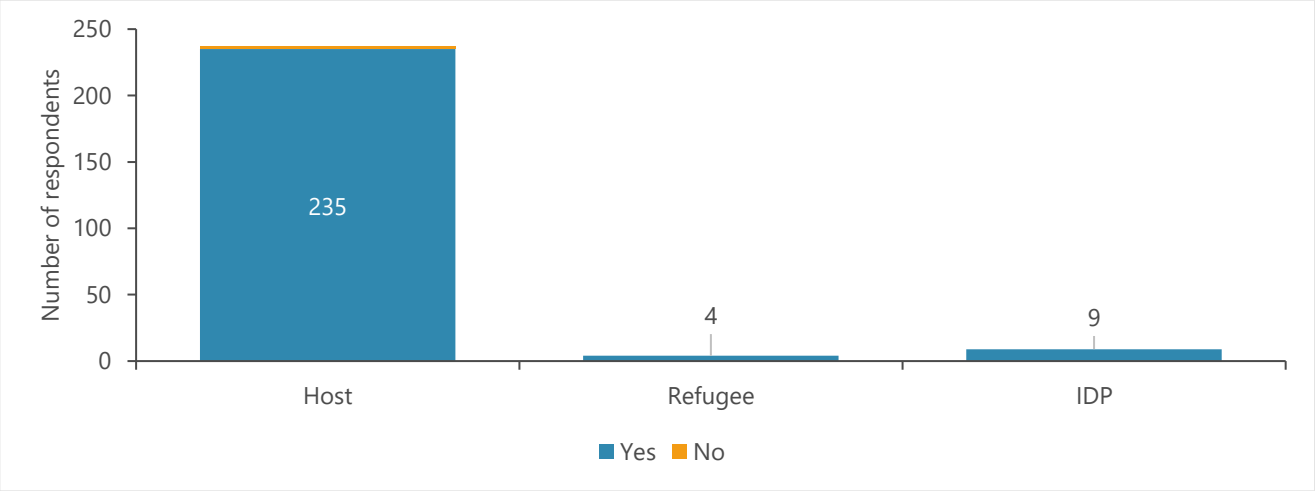
5.2. Subsidy level determination and impact

Results: Evidence-based subsidy deepening improved FDP inclusion and made products affordable for reached households, but future demand remains subsidy-dependent and shaped by wider market barriers

Evidence-based subsidy deepening materially improved FDP inclusion. The pilot shifted from a uniform price to differentiated end-user pricing after EnDev's 2024 socio-economic study and consultations with UNHCR, local authorities, beneficiaries, and participating companies. This adaptation reduced the FDP price point while maintaining a beneficiary contribution. Programme evidence indicates that FDP households increased to approximately 20% of total sales after the subsidy was deepened, compared with a single-digit share before the adaptation. This suggests that the initial targeting model could identify FDP households, but effective inclusion depended on whether the final price matched their ability to pay.

The adapted subsidy made products affordable for reached households, but this should not be read as full affordability for all vulnerable groups. Survey results show that 99.2% of respondents(n=248) considered the final purchase price affordable, 71.6% reported that the product was cheaper than similar local alternatives (n=179), and 93.2% were aware of the subsidy at the point of purchase (n=233). These results indicate that the pricing message was clear and that the subsidy materially reduced the affordability barrier for households who purchased through the pilot. However, the achieved sample is primarily composed of host community respondents, meaning FDP affordability findings should be interpreted alongside FGDs, KIIs, and programme sales data.

Figure 3*: Beneficiary views on affordability*



The price adaptation was consultative, but acceptance of differentiated pricing remains context-specific. FGDs in mixed host–FDP villages, conducted with UNHCR and local authorities, helped explain the rationale for deeper subsidies for more vulnerable households. Findings suggest that host communities generally understood the vulnerability logic after discussions, although some participants still questioned why FDP households paid a lower price for similar products. This did not generate broad social tension in the available evidence, but it remains a fairness risk to monitor as differentiated pricing continues.

Product choice shows that perceived value mattered alongside price. The programme initially allowed lower-cost Pico PV systems and higher-value SHS products to match different affordability levels. In practice, many beneficiaries preferred SHS after understanding its broader functionality, including lighting, phone charging, and additional household use. This reduced demand for Pico systems and created stock risks for companies that had planned for higher Pico uptake. The finding suggests that affordability calibration should account not only for the lowest possible price point, but also for the product features households consider worth saving for, and the technologies within the product portfolio should not have significant technical differences.

Maintaining a beneficiary contribution supported product valuation, but future purchases remain subsidy dependent. Mayaki Trading and Sol Niger both emphasised that some financial contribution helps maintain user engagement and reduce the risk of product misuse or low commitment. Household survey results are consistent with strong product value: 92.8% of respondents use the product daily (n=232), 93.6% rate it as very useful (n=234), 99.2% still own the product (n=248), and 97.2% report that it is functional (n=241). At the same time, 83.6% of beneficiaries (n=209) indicated they would still need a subsidy to buy their next energy product, with this need higher among FDPs than host communities. This points to sustained affordability constraints rather than confirmed subsidy-induced dependency.

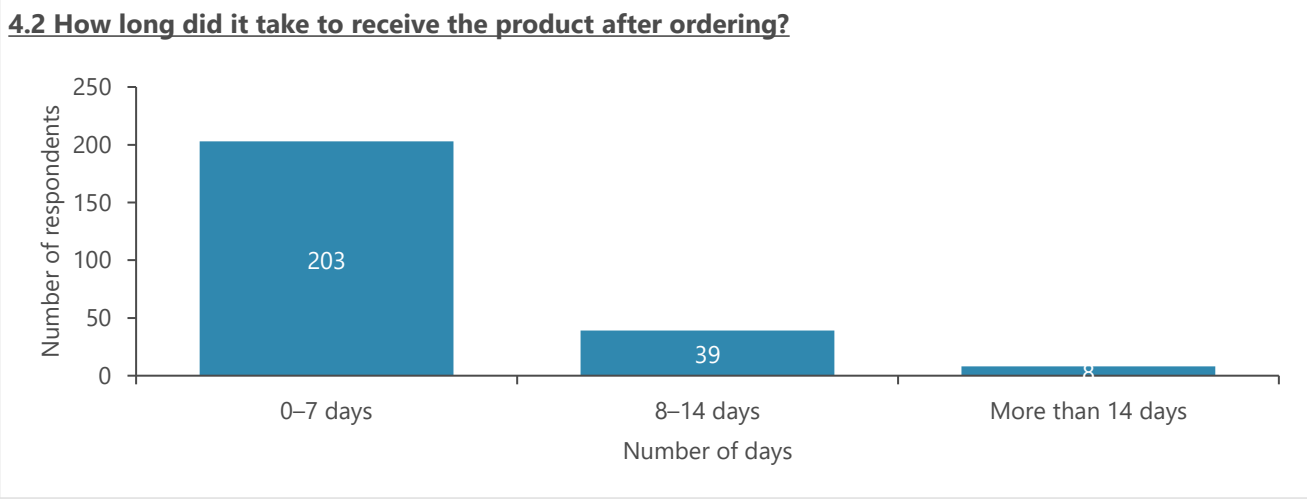
Affordability was necessary but not sufficient to explain uptake. The pilot showed that lower prices had to be combined with awareness-raising, trust-building, product education, logistics support, after-sales capacity, and local distribution networks. Demand increased after the subsidy was deepened, but it also depended on community sensitisation and the ability of companies to reach remote and displacement-affected areas. This reinforces a key Niger lesson: subsidy calibration can unlock demand, but only when embedded in a broader delivery and market-building system.

5.3. Delivery and communication effectiveness

Results: Programme-supported agents, logistics, and local sales infrastructure enabled delivery in areas with weak commercial networks, but verification and reimbursement cycles created the main operational strain

Delivery performance depended on ecosystem-building support because rural commercial networks were limited before the pilot. The pilot combined trained community agents, sales pavilions, energy kiosks, programme-supported logistics, and company-led sales activity to reach remote and displacement-affected communities in Maradi and Tahoua. This support was primarily responsible for creating an effective and well-structured local market ecosystem, as the sales and operational costs in these remote regions would have been much higher and practically prohibitive for the participating companies. This enabled companies to sell certified solar systems in a highly cost-efficient way, successfully overcoming the barriers of limited after-sales presence and low consumer familiarity. Household survey results suggest that this model worked for reaching beneficiaries, with most respondents receiving products quickly, understanding the price before purchase, and reporting access to agent support when needed.

***Figure 4**: Beneficiary views on installation speed*



Communication was effective because it used trusted local channels rather than a single information route. Most beneficiaries were aware of the subsidy before receiving the product and understood the total cost at the point of sale. Information was reinforced through company agents, community members, local leaders, radio, flyers, and peer networks. FGDs in Doukou-Doukou and Garin Kaka suggest that beneficiaries generally understood the temporary and promotional nature of the subsidy, although visible involvement of development actors sometimes created expectations of free distribution in some refugee communities. This reinforces the importance of company-led communication at the point of sale, supported by local leaders and community channels.

***Figure 5**: Beneficiary discount/subsidy discovery before purchase*



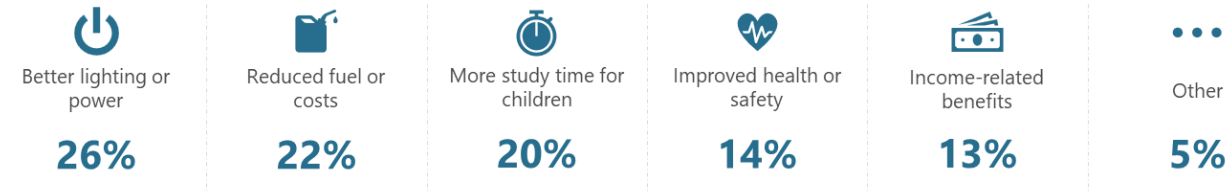
The pilot strengthened local delivery capacity beyond short-term transport support. Around 500 community-based agents were trained in installation, marketing, and maintenance, supported by standardised commission incentives. Participating companies also expanded their local field presence during implementation, which built customer trust, established continuous accessibility between the demand and supply sides, and ultimately reduced the cost of reaching rural customers. Survey evidence showing a high willingness to buy again from the same company suggests that the delivery model contributed to customer confidence, not only short-term uptake.

5.4. Subsidy valuation and behavioural impacts

Results: Households valued and integrated solar products into daily routines, while continued subsidy dependence reflects structural poverty and displacement-related affordability constraints more than clear evidence of behavioural distortion

Households valued the solar kits and integrated them into daily life. Survey and FGD evidence consistently indicate that beneficiaries viewed the products as useful and reliable. Respondents reported improved lighting, more study time for children, better safety, phone charging, and reduced reliance on kerosene lamps, torches, generators, and uncertified solar products. FGDs also suggest that the kits quickly became part of daily household routines, with benefits extending across household members. This indicates that the subsidy did not significantly reduce perceived product value among reached households.

Figure 6: *Product benefits for respondents*



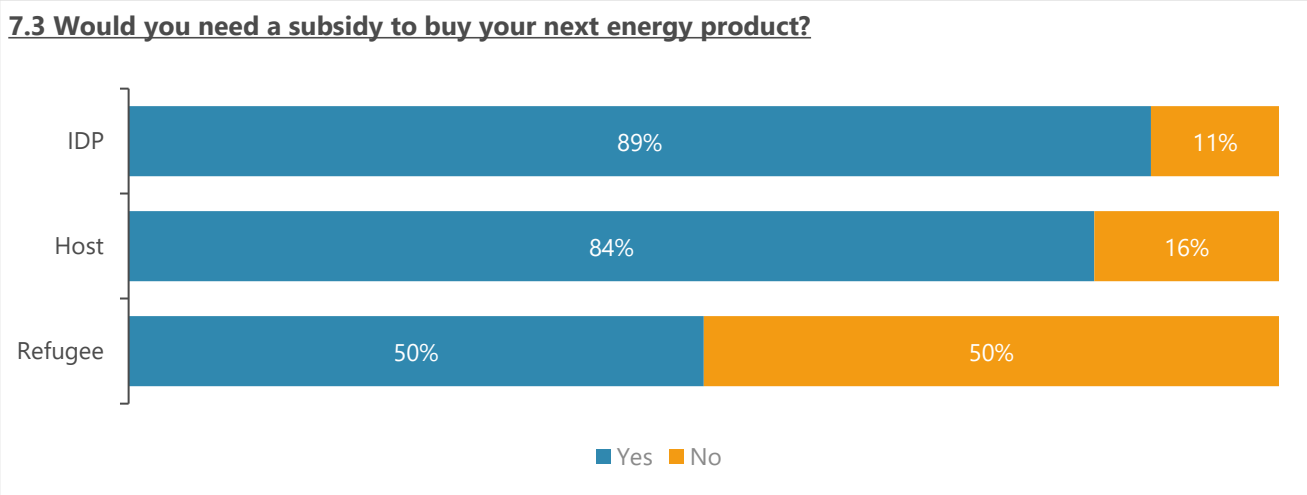
There is limited evidence of broad social tension or product misuse. Most surveyed households reported no subsidy-related tensions in their community, and FGDs suggest that fairness concerns were concentrated around differentiated pricing rather than rejection of the programme itself. Some host community participants questioned why FDP households paid a lower price for similar products, but this should be treated as a forward-looking risk to manage rather than evidence of widespread conflict. Reported resale, lending, or sharing pressures also remain limited in the available evidence.

Payment behaviour suggests that short-cycle financing was manageable for most reached households. Among respondents who purchased on credit, most reported keeping up with payments, supported by short repayment cycles, agent-managed cash collection, and PAYGo deactivation where applicable. This suggests that the financing model worked for households with some payment capacity. However, it does not imply that the model reaches households with no stable income or no ability to make even small contributions.

Continued subsidy dependence reflects structural affordability constraints more than confirmed subsidy-induced distortion. Most respondents indicated that they would still need support to purchase another energy product. FGDs and KIIs reinforce that unsubsidised prices remain out of reach for many households, particularly in displacement-affected communities where income is low and irregular. This points to a continued affordability

gap rooted in poverty and displacement conditions, rather than clear evidence that the pilot itself created dependency or weakened willingness to pay.

***Figure 7**: Beneficiary response to subsidy requirement for future purchases*



5.5. Verification

Results: Independent verification strengthened accountability and company reporting quality, but reimbursement delays became the main operational bottleneck affecting company liquidity

Independent verification has strengthened accountability and improved company reporting quality. In a first-of-its-kind RBF rollout in Niger, the IVA was kept structurally independent from participating companies to protect the integrity of sales claims. Verification requirements, including GPS coordinates, customer identifiers, serial numbers, and witness contacts, pushed companies to improve their documentation and reporting practices over time. Approximately 6% of company-reported sales were flagged or rejected, mainly due to connectivity failures, beneficiary mobility, and data-entry issues rather than clear evidence of systematic product misuse or resale.

Verification protocols had to adapt to Niger's field conditions. Phone-based verification was constrained by weak mobile coverage, shared phones, and high beneficiary mobility in rural and displacement-affected areas. Security restrictions also limited IVA travel to some locations, requiring the programme to use teams already present on the ground to support field validation. Regularisation rounds between the Fund Manager and companies helped validate legitimate sales that had been completed but were initially poorly documented. This adaptation improved feasibility while maintaining the principle of independent verification.

Reimbursement delays became the primary operational bottleneck for companies. Monthly verification and disbursements were scheduled deliberately to boost working capital for participating companies. In practice, however, coordination gaps between the IVA, Fund Manager, and field teams created delays and liquidity strain largely because implementing partners in Niger, including the solar companies, had no prior experience with RBF models. Early verification rounds became a learning process by necessity, and efficiency improved as familiarity grew. Companies consistently identified faster claim resolution, clearer rejection feedback, and stronger coordination between the IVA, Fund Manager, and field teams as the main priorities for further improving verification efficiency.

The key trade-off is between maintaining verification rigour and achieving delivery efficiency that makes RBF support meaningful for companies. Strong verification helped protect RBF's integrity and professionalise company reporting, but the resulting delays, compounded by partners' initial unfamiliarity with RBF, undermined the working capital benefits the monthly schedule was designed to provide. Future DSS rounds should preserve independent verification and account for this curve, shifting focus beyond demand generation toward proactively streamlining verification, reimbursement, and operational coordination without compromising accountability.

5.6. Market distortion assessment

Results: The pilot shows limited evidence of market distortion and appears to have created rural demand where little certified commercial activity existed, but post-subsidy continuity depends on sustained market-building support

The pilot appears to have supported rural market creation rather than crowding out existing commercial activity. Niger recorded fewer than 4,000 certified off-grid solar sales nationally across 2022–2023, compared with more than 13,000 systems sold through the pilot. Sol Niger reports that DSS-supported sales account for approximately 80% of its total sales, while Ouba Energy reports approximately 90%. In this context, high subsidised sales are less a sign of displacement and more evidence that DSS became the main channel for activating certified rural OGS demand in areas with limited pre-existing commercial activity.

DSS was necessary but not sufficient without parallel ecosystem-building support. The programme operated in rural areas where distribution networks, consumer awareness, technical capacity, and after-sales systems were weak. Uptake, therefore, depended not only on lower prices but also on community agents, kiosks, logistics support, product education, and local service presence. This suggests that the Niger pilot should be interpreted as a market-building intervention with a subsidy component, rather than as a narrow price discount.

There is limited evidence of classic market distortion in the available data. Survey and FGD findings do not show structural resale, leakage, product sharing, or displacement of existing unsubsidised sales. Product retention remains high, reported sharing is limited, and field observations found few signs of resale or diversion. This indicates that the subsidy reached and remained with the intended users in most observed cases, although continued monitoring remains necessary as volumes grow.

Future demand continuity is the main market risk. Most beneficiaries reported they would need a subsidy to buy another energy product, despite knowing that the subsidy was temporary. This reflects persistent rural poverty and displacement-related affordability constraints, rather than confirmed subsidy-induced behavioural distortion. Companies suggest that an abrupt return to unsubsidised prices would likely reduce demand sharply. A gradual transition, using longer repayment cycles, continued after-sales presence, kiosks, and phased price adjustments, would reduce the risk of post-pilot demand contraction.

Differentiated pricing created a fairness risk to monitor, but not evidence of broad market distortion, as it was only applied for 2 months. Pre-adaptation FGDs, temporary promotional messaging, and local-authority communication helped explain why FDP households received a lower price than host community households during the promotional window. Some host community participants still questioned the price difference, but survey and FGD evidence do not indicate widespread tension. This should therefore be managed as a forward-looking social cohesion risk, rather than treated as a current distortion of the market.

6. Recommendations

The Niger DSS pilot demonstrated that demand-side subsidies can substantially expand access to off-grid solar in rural areas with limited certified product penetration, weak last-mile distribution, high displacement-related vulnerability and fragile country context. At the same time, the findings highlighted important trade-offs between inclusion, affordability, operational feasibility, accountability, and long-term market sustainability. The recommendations below focus on practical implementation options that future programmes could consider when refining DSS approaches in Niger and similar last-mile, displacement-affected contexts.

1. Use geographic targeting combined with local-authority vulnerability records in low-data displacement settings

Geographic targeting combined with existing administrative and humanitarian records offers a practical approach where household-level poverty data is unavailable. In Niger, municipal family booklets, national ID cards, and IDP lists maintained in Kobo by local authorities provided a workable and relatively cost-efficient basis for eligibility verification. This approach is less precise than a full social registry, but more feasible in mobile, low-connectivity, and displacement-affected areas.

Use geographic and demographic targeting with pre-existing local authority records that are routinely maintained and independently verifiable. Municipal Family booklets, national ID cards, and existing IDP registration lists provided a practical and cost-efficient baseline for displacement-based eligibility verification in low-data, low-connectivity contexts such as Niger. For vulnerability sub-groups not already tracked in local administrative systems, programmes should invest in primary data collection through socio-economic studies or community-level verification processes to lower the risk of tampering and inherently inaccurate targeting, exclusion of genuinely vulnerable households, and potential damage to programme credibility and community trust.

The trade-off is between speed and cost on one hand and targeting accuracy and integrity on the other. In displacement-affected and politically sensitive contexts, programmes should prioritise the latter, accepting the additional upfront investment in primary data collection as a necessary condition for reliable and defensible targeting. Independent validation should be built into the process regardless of the data source used.

2. Design pricing tiers based on upfront ability-to-pay analysis, while maintaining a structured mechanism for timely adjustments

During the design phase, the program effectively utilised product diversity, introducing smaller Pico-PV systems for refugees and larger SHS for host communities, to accommodate distinct income levels. However, field data subsequently revealed a host-refugee income gap and low Pico-PV demand, demonstrating that product variation alone cannot substitute for direct price differentiation when baseline affordability gaps are known in advance. The program successfully adapted by deploying a progressive strategy combining targeted awareness campaigns and flexible instalment plans with deeper, specific SHS subsidies for FDPs. Future programs should translate early ability-to-pay findings directly into distinct pricing structures before launch. Furthermore, instead of promoting an overly wide range of technology tiers upfront, which risks misaligning with actual demand patterns and creating operational strain for distributors' initiatives, distributors should prioritise a narrower,

better-calibrated product range backed by structured review mechanisms to adjust thresholds based on live performance data.

3. Fund delivery infrastructure as a core programme component, not as an implementation add-on

Subsidies alone would not have generated uptake at scale in Niger because formal rural distribution, after-sales presence, and consumer awareness were limited before the pilot. Community agents, sales points, logistics support, after-sales capacity, and consumer education should therefore be budgeted from the start. These elements helped companies reach rural and displacement-affected customers and created a local commercial presence that can support continuity after the pilot. The trade-off is that ecosystem-building requires longer timelines and clearer handover planning than a narrow price-subsidy model.

4. Plan the post-subsidy transition from the start through structured institutional alignment.

The exit pathway should define how market momentum will be sustained as pilot subsidies phase out. In Niger, persistent affordability constraints mean most beneficiaries still require financial assistance to purchase subsequent energy products. A realistic transition requires combining gradual price adjustments, extended repayment options, and the preservation of the local agent and kiosk infrastructure built during the pilot. Crucially, supply-side coordination with large-scale initiatives such as the World Bank's HASKE program was intentionally integrated into the design phase; however, subsequent external political shifts and project timelines hindered the synchronized operational overlap originally envisioned. Future initiatives should design transition frameworks to be modular, ensuring that the local distribution networks and stimulated demand can seamlessly interface with new institutional partners or transition into autonomous commercial models even when primary project timelines diverge.

5. Integrate energy access into formal humanitarian and social protection frameworks for households completely lacking financial means

The pilot adhered to a market-based model, which successfully built commercial viability for segments with basic purchasing power. However, programme data demonstrated that households with no reliable income could be sustainably reached through market-driven tools alone. Because free giveaways or uncoordinated aid can deteriorate sustainable market growth and increase social tensions, future initiatives should embed energy access into broader humanitarian assistance and national social safety nets. Establishing structural alignment and data-sharing interfaces with actors like UNHCR from the design stage allows cash-transfer programs to layer with commercial mechanisms, building the purchasing power of ultra-vulnerable families without causing market distortion.

6. Incorporate local infrastructure and structural constraints into capacity-building frameworks for private suppliers

The DSS established standardised reporting fields and provided continuous onboarding for companies and their field agents. However, external realities, including low digital literacy, limited IT expertise, weak network coverage, and geographical barriers, created data-entry and verification bottlenecks. Future initiatives must treat these operational realities as core components of upfront company capacity-building and training. These programs should equip distributors with robust cash-collection protocols, alternative contact validation techniques, and low-connectivity data management strategies to improve field-level efficiency without weakening accountability.

7. Address primary fund-manager disbursement bottlenecks to eliminate supplier working-capital constraints

The verification framework effectively protected public funds and maintained high data integrity, but payment lags introduced liquidity pressures for participating firms. While data-entry errors and server downtime were secondary contributors, the primary driver of these delays was the late release of funds by the fund managers. True relief for distributor cash flow, particularly for smaller last-mile firms, requires treating the complete payment-cycle timeline as a core operational KPI. Future programs must address this by establishing milestone-based capital advances and pre-funded rolling cash pools at the fund-manager level, ensuring that capital releases are prompt and reliable the moment verification checks are cleared.

7. Conclusion

The Niger DSS pilot demonstrated that demand-side subsidies can accelerate access to certified off-grid solar in rural areas with limited commercial activity and high displacement-related vulnerability. Across the household survey, FGDs, and KIIs, beneficiaries reported that the product was affordable, useful, and reliable, with limited social tension and no clear signs of resale, leakage, or displacement of existing commercial sales. More than 13,000 quality-certified systems have been sold through the pilot since launch, approximately three times the cumulative volume of certified sales recorded nationally across 2022–2023.

The pilot also showed that targeting performance and LNOB outcomes depend heavily on structural market realities, rather than solely on eligibility design and subsidy level. Initial uniform pricing reached host communities effectively but generated limited FDP uptake due to cash-flow constraints. In response, EnDev deployed an evidence-based and consultative strategy, conducting FGDs with UNHCR, local authorities, and affected communities to balance commercial viability with localised purchasing barriers. By layering targeted demand-stimulation measures, the project increased FDP reach. This points to a clear lesson for future DSS design: maximising inclusion requires pairing eligibility frameworks with flexible consumer financing structures and intensive, localised demand-generation strategies that accommodate the distinct economic profiles of target groups.

The implementation experience highlights the importance of pairing subsidies with delivery infrastructure and adaptive operating systems. Programme-supported delivery infrastructure, including around 500 community agents, 50 sales pavilions, two energy kiosks, logistics support, and after-sales presence, helped compensate for the absence of a pre-existing rural commercial network. Verification rigor also preserved RBF integrity and improved company reporting quality over time, although reimbursement delays created operational strain for participating companies. Iterative subsidy calibration, increased company advance payments, and the use of in-area teams when IVA travel was constrained by security show that the programme adapted to field conditions, while also highlighting the need to streamline verification and reimbursement cycles in future phases.

Looking ahead, the Niger pilot positions DSS as part of a broader market-building strategy rather than as a stand-alone affordability instrument. The post-pilot pathway will need to manage four trade-offs: households that remain unable to purchase even at subsidised prices, company liquidity pressure under the current verification cycle, continuity of demand after the pilot, and continued monitoring of fairness perceptions

around differentiated pricing. Coordination with the World Bank-financed HASKE programme provides a potential supply-side complement to the demand-side pathway tested through DSS.

Overall, the Niger DSS pilot provides important evidence that demand-side subsidies can support both energy access and early market development when they are evidence-based, operationally flexible, paired with local delivery infrastructure, and coordinated with complementary supply-side support. The pilot should therefore be treated as a learning case for designing DSS in last-mile, displacement-affected settings where affordability constraints and weak market infrastructure need to be addressed together.